Vol. 29 Parts 1—2.

Rubber Research Institute of Ceylon

Combined 1st & 2nd Quarterly Circulars for 1953

November, 1953

1 MAR 1954

Rubber Research Institute of Ceylon

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NOTICES

DARTONFIELD ESTATE — VISITORS' DAY

The services of technical officers are available to visitors on the second Wednesday in each month ; the estate superintendent is available every Wednesday. Visitors are requested to arrive on the estate not later than 9-30 a.m.

Visitors will be welcomed at the station on other days provided an appointment has been made in advance.

Dartonfield Estate is situated about 3½ miles from the main Matugama—Agalawatta Road, the turn-off being near culvert No. 14/10. The distance from Colombo is approximately 47 miles.

PUBLICATIONS

Rubber Research Institute publications comprising Annual Reports, Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors (resident in Ceylon), Superintendents and Local Agents of rubber estates in Ceylon over 10 acres in extent. Forms of application can be supplied to the Superintendents of large estates for the use of their assistants.

It will be appreciated if subscribers will return any back publications which are of no use to them.

ADVISORY CIRCULARS

The undernoted Circulars may be obtained on application at 30 cents per copy. Future issues in the series will be sent free of charge to estates registered for the receipt of our publications:—

(1) Notes on Budgrafting Procedure (Revised May, 1952).
(5) Straining box for latex (January, 1940).
(6) Notes on the care of Budded Trees of Clone Tjirandji 1 with special reference to Wind Damage (Sept. 1938).
(12) Warm Air Drying House for Crepe Rubber (Reprinted 1952).
(17) Tapping Young Budded Trees—Prevention of Precoagulation (2nd Supplement) (Revised March, 1949).
(19) Density of Planting and Thinning out (December, 1942).
(21) The Control of Bark Rot and Canker (Revised February, 1952).
(23) Uniformity in the Nomenclature of Clones & Clonal Seedlings (December, 1944).
(28) Oidium Leaf Disease (November, 1950) (superseding Circular No. 22).
(31) Root Disease in Replanted Areas (October, 1951) (superseding Circular No. 10).
(32) Crown budding for Oidium Resistance (October, 1951).
(33) Mechanical Felling of Rubber Trees (February, 1952).
(34) Tapping Systems (February, 1952) (superseding Circular No. 17).
(35) Notes on Rubber Seedling Nurseries (February, 1952) (superseding Circular No. 3).
(36) Contour Lining, Holing and Filling, Cutting of Platforms, Trenches and Drains (superseding Circular No. 4).
(37) Manuring of Rubber (superseding Circular No. 30).
(38) Planting and After Care of Budded Stumps and Stumped Budgrafts (superseding Circular No. 8).
(39) Clonal Seed as Planting Material (superseding Circulars No. 26 & 27).

* NOTES ON REPLANTING PROCEDURE.

BY

C. A. de Silva, Botanist.

Introduction.

THE present time is opportune for presenting this publication combining the information given in our circulars on specific phases of replanting work, which will serve as a guide to the less experienced rubber growers, who will take advantage of the facilities offered under the Rehabilitation Scheme for replanting with a subsidy from the Government of Ceylon.

The items of replanting under various heads are discussed with particular reference to recent costs of replanting 35 acres on Dartonfield Estate in 1952. The items of replanting are dealt with more or less in the order in which they are normally followed. Apart from the establishment of nurseries for providing budgrafts and clonal seedlings, provision should be made for a supply of planting material at least two years ahead of actual replanting operations. An oversight in this respect will present extreme difficulties in providing planting material for replanting in any particular year. This will be the most vital factor concerned with the progress of the Rehabilitation Scheme. The fluctuation in costs for any particular item of replanting work will largely depend on the standard of agricultural practice adopted. The costs at Dartonfield represent the standards of good agricultural practice expected in replanting work according to the economics of production, at the present time. These costs will be referred to where necessary,and a summary will be found in the appendix.

Felling and Clearing: For the small and middle-class holder dealing with a limited acreage the established methods of felling, burning and clearing by hand are already known and it is not necessary to describe these operations. In most cases a favourable contract can be obtained for general clearing and sale of firewood. The danger of root disease must not be overlooked and comments of this aspect of preparation of the land must be carefully noted.

The methods used for eliminating the old stand and clearing are as follows:—

1. Felling by hand.
2. Felling by Elephant.
3. Felling with a "Monkey Grubber".
4. Poisoning with Sodium Arsenite (not permitted in R.R.R.S. plantings).

In the first three methods, where land is accessible for the transport of timber, favourable contracts can be obtained for the sale of timber for firewood. This is generally done. For large scale felling methods 2 and 3 are the more suitable methods.

Felling at Dartonfield was done with the "Trewhella Monkey Grubber" with estate labour. A favourable contract for the disposal of the timber gave a profit of Rs. 7/35 per acre. This method is fully discussed in Advisory Circular No. 33.

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* The recommendations given in these notes do not in all instances conform with the special regulations laid down by the Rubber Rehabilitation Board. The Rubber Controller should be consulted, when planting under the Subsidy Scheme.

From a point of view of effectively eliminating root disease, the methods of completely removing the root system are most advantageous. The whole of the underground root system is exposed, which eases the task of tree to tree examination. The presence of Fomes Lignosus in the roots of apparently healthy trees of the old stand proves beyond doubt that if the trees are not uprooted, the root system may become a source of infection to the new stand of rubber. A preliminary attention to infected trees on the Dartonfield clearing cost approximately Rs. 60/- per acre; and provision has been made for further attention in the second year of the replanting. This extra cost of attention to root disease indicates the necessity of giving the fullest attention to root disease before planting. (See appendix for summary of costs).

The advantages claimed for leaving the timber of the old stand to decay has been discussed recently in our advisory circular on manuring No. 37 with regard to the presence of a 40—50 year accumulation of plant nutrients in the timber in the form of phosphates and potash; the nitrogen in most cases being of lesser importance due to losses under most conditions of above ground decomposition. The availability of the accumulated nutrients may seem rather problematical in actual practice, but the decaying of the timber provides humus, which can be expected to considerably improve the soil and water holding capacity for many years. The advantages of leaving the timber on the land can also be claimed for the poisoning methods, but the presence of root disease in the old stand constitutes a real danger. The previous root disease history of the old stand should be a guide for making a choice of the method for felling and clearing the old stand. It is known that sodium arsenite does not kill the fungus of Fomes Lignosus if present in the root system. The fungus which is a facultative parasite, can survive on the dead root until such time that it can infect the root system of the new stand of rubber. It should be noted, that the poisoning method was used in Malaya for planting seed-at-stake for budding in the field. Damage to seedlings in the first two years is not so serious as the losses of budded stumps planted directly after poisoning. *The elimination of the old stand of rubber by poisoning is not permitted under the Rehabilitation Scheme.*

Fencing: It is essential to surround the clearing with barbed wire fencing to keep out cattle. In general hard wood posts such as "Milla", "Diyana" "Goraka" are used in Ceylon or the more permanent concrete posts. At a later stage the fences may be strengthened by planting additional live posts such as "Kapok" or Arecanut palms, and "Wal Ahala" especially if the area comes just within the outer boundaries of the estate. Four strands of barbed wire should be fixed to the posts 1 foot apart starting from 9 inches above the ground. The cost of fencing will depend on the size and shape of the area to be planted.

Roads and Paths: At this stage it is necessary to trace inspection paths that may be required. The construction of these paths can be generally deferred until more important works have been completed. The trace should not interfere with planting rows and drains. If a road is required the necessary strip of land must be reserved. Paths and Roads are essential for efficient supervision of the clearing and disease control operations such as sulphur dusting.

Soil Conservation and Drainage: The proper collection and removal of surface run-off water and the conservation of soil are of paramount importance in replanting any cultivated land. These operations should be started as soon as the land is sufficiently cleared to demarcate the natural drainage lines and the general layout of the drainage system according to the gradient of the

land and requirements of soil conservation regulations. Under the present costs of replanting, heavy earthworks of any type must be the exception rather than the rule. Existing old drains and silt pits are generally utilised, if these conform to soil conservation regulations. Adivsory Circular No. 36 deals with the more elaborate types of earth-works that can be adopted for soil conservation. In the Dartonfield clearing the following items of expenditure were incurred under this head.

	Cost per acre	
	Rs.	Cts.
Clearing out old drains and silt pits		94
Terracing repairs	4	34

The types of drains recommended is a series of silt-pits on the contour with a gradient of about 1 in 120, measuring 10 feet long 2 feet wide and $1\frac{1}{2}$ feet deep, spaced at intervals of 3 feet and connected by a shallow drain 9 inches deep, which forms a band between the chain of silt pits. The approximate cost will be about Rs. 130/- to Rs. 140/- per acre.

Cover Crop: It is important to establish a ground cover as soon as the land is cleared. On well conducted estate plantations the clearing of land encourages the existing leguminous covers to recover rapidly especially Desmodium ovalifolium and Pueraria phaseoloides. The latter is by far the more effective cover against soil wash, but on the large acreages the expense of keeping this cover away from the young plants becomes quite a costly item.

In the absence of ground cover it is best to establish a cover of Desmodium ovalifolium by forking in rooted cuttings of this cover, which can be obtained from a neighbouring estate or from areas already planted with this cover. A spacing of $4' \times 4'$ with a basic dressing of 2 to 3 cwts. of rock phosphate will accelerate the growth of this leguminous cover. Other ground covers such as Calapogonium mucunoides, Centrosema pubescens, Dolichos hosei (Vigna) can be propagated by seed in the early years. Most of these will not stand the shade of mature trees and the covers suggested earlier will have to be established later as more permanent ground covers.

Erect covers such as Crotolaria anagyroides, Clitoria cajanifolia, Fleminga congesta can be planted as contour hedges about 5 to 6 feet away from planting rows on the lower side for protection of the rubber plants during the early years. These covers alse prevent erosion, when the land is fully exposed. The choice of erect covers will depend on the ease with which seed can be purchased.

Non-leguminous covers of suitable growing qualities, Mikania or even weeds, are better than no cover at all, provided areas of about 3 foot radius are clean weeded round the plants or continuous contour weeding along planting rows is carried out during the early years of growth.

The items of expenditure under the head of covers at Dartonfield were as follows:—

	Cost per acre	
	Rs.	Cts.
Clearing grass and shrubs	68	50
Weeding	85	25
Cover crops	6	29

Lining for Holes: At the present time our recommendations for spacing provide for a high initial stand per acre. In all cases of steep and undulated land, lining should be on an approximate contour. The spacing recommended is for an avenue system of planting, which provides for natural thinning out of high stands of rubber in stages over a period of years with the least tendency to create large spaces, which is inevitable in close square planting. The more extreme forms of "avenue" planting leading to "hedge planting" provide for maximum utilisation of sun-light for assimilation. Very successful results have been obtained with "hedge planting" in Indonesia and a trial on this system will be useful to supplement the information from "hedge planting" in our own clearings. "Hedge planting" was carried out on a 35 acre clearing at Hedigalla and the growth and general development have been quite satisfactory.

	Planting distances (Budgrafts)	Points per acre
"Avenue" planting	9′ × 30′	160
	8′ × 35′	160
	8′ × 30′	180
"Hedge" planting	6′ × 40′	180
	6′ × 45′	160

The 160 points are sufficient where a rigid selection of stocks is made in the nursery for budgrafting. Where the terrain shows rocky out-crops and holing is difficult, it will be necessary to hole above the theoretical stand. For example, hole at 200 points to obtain 180 points, and hole at 180 points to obtain 160 points. Similar "avenue" systems of planting are recommended for clonal seedlings, where the system is essential to allow for selective and natural thinning out of high initial stands over a long period in stages.

Planting distances (clonal seedlings)	Points per acre
5′ × 30′	290
5′ × 35′	249
5′ × 40′	217

The lining in the Dartonfield clearing was a compromise between contour and straight line planting. All lines did not follow exact contours. Depending on the general topography of the land, suitable sections of land are selected between natural main drains and stream reservations. A middle contour is traced accurately with a road tracer across the area, half way up the slope. The smaller curves are straightened out and parallel planting rows are marked above and below the central contour. The spacing between rows is done by taking the horizontal distance and not along the ground, at sufficient intervals, to fit in approximately parallel planting rows; one or two operations may be necessary to take the horizontal distance on very steep land. Where the terrain is not difficult the centre contour lining can be easily marked continuously through the whole clearing. The spacing at Dartonfield was 9′ × 30′. The costs were as follows:—

	Cost per acre Rs. Cts.
Lining (including cost of pegs)	5 . 27

The materials required for contour lining are:—

Road Tracer, Lining rope, red or white cloth tabs, Measuring tape, Lining pegs.

In the method used at Dartonfield the minimum use is made of the road tracer. Existing drains, if utilised, may come within rows at irregular distances, but there is no great objection to this. If a particular contour drain comes with 5 feet of the rows, it can be blocked and used as a silt-pit. A new drain can be opened at the required distance.

Holing: Owing to the high cost of earth works, modified holes of limited dimensions are cut to accommodate planting material of various sizes. For large budded stumps the holes are cut $2\frac{1}{2}' \times 2\frac{1}{2}' \times 1'$ with a central alavangohole as given in Advisory Circular No. 38. In general, holes cut $1\frac{1}{2}' \times 1\frac{1}{2}' \times 1\frac{1}{2}'$ with central alavango hole have given very satisfactory results. Further information on holing and felling will be found in Advisory Circular No 36. A considerable number of casualties in the field arise from irregular methods of planting out; these are fully discussed in Advisory Circular No. 38.

The costs under holing and felling at Dartonfield were as follows:—

	Cost per acre Rs. Cts.
Holing at 160 points per acre ($1\frac{1}{2}' \times 1\frac{1}{2}' \times 1\frac{1}{2}'$)	27 . 50
Filling	15 . 00

Planting Material: The recommendations with regard to planting material can only be appreciated if one has a clear knowledge of the differences between clonal seedlings and budded stumps; the latter representing budgrafted rubber. Clonal Seedlings are obtained from seed collected from clones. Some clones produce seeds which give a high percentage of high yielding trees, while others give a smaller proportion of desirable trees and some others give poor trees. No two clonal seedling trees are alike in growth and yield characteristics under any conditions of production. It is essential, therefore, that large scale planting with this material must be done with recommended families only. The obvious safeguard against poor results is to plant at a high stand per acre for subsequent thinning out of poor growers and yielders. At the present time only TJ.1 selfed seed and PBIG seed from Malaya are recommended for large scale planting. Both these "types" of clonal seedlings have given yields which are equal to or even better than the best yielding clones.

Mixed clonal seed from known parent clones may come up to standard, but we have no results from these plantations at the present time, and we should only plant such seedlings on a limited scale. Mixed Clonal Seed can, however, be planted out in nurseries if such seed is used only as stocks for budgrafting. A nursery of seedlings of clone TJ.1 will serve the dual purpose of supplying stocks and clonal seedlings for large scale planting. With such a nursery a change in policy can be made within a few months of planting out in favour of budgrafts or clonal seedlings.

Nurseries: All nurseries should be established two years before planting for budwood, stocks and clonal seedlings. The general layout of nurseries is given in Circular No. 35.

Budwood Nurseries. These can be established by planting out budded stumps $2\frac{1}{2}'$ in rows and 3′ between rows. The first crop of budwood can be taken after 18 months to 24 months growth; one stump will provide $2\frac{1}{2}$ to 3 yards according to growth. Manuring can be done as for plants in the field, according to the quantity of budwood taken. No manuring should be done

within 3 months of cutting budwood. After the first crop of budwood, 2 shoots are allowed to develop for the next crop, which will come in after about 12 to 18 months growth; finally 4 shoots are allowed to develop in an old budwood nursery. When rubber growers are short of budwood it is possible to develop budwood by pollarding authenticated mature trees of a particular clone; 4 to 5 shoots developing on such trees will give 10 to 15 yards per tree in about 12 months. This is a subterfuge in an emergency which must be the exception rather than the rule.

Seedling Nurseries: This has already been discussed and is fully dealt with in Circular No. 35. For whatever purpose the nursery is required, selective thinning out has to be done after about 6 months growth, when it is possible to eliminate "yellows" and obvious poor grown seedlings. After about one year's growth the poor growers are eliminated. This thinning out is necessary for budgrafting the best grown stocks, because even the best clones reputed for high yields, if budded on to runts, sometimes in the 3rd or 4th budgrafting season, must develop into a poor stand of budded rubber. Such areas will produce yields that will fall far below the expected standards. The same conditions will be true of nurseries where seedlings are finally planted out directly as clonal seedlings. If the nursery is selectively thinned out, the plants will provide a stand of good growers and a high percentage of good yielders, which when further thinned out in the field in the first years of tapping, will finally give trees with good growth and high yielding capacity.

In cases where "pencil" size clonal seedlings are planted in the field from a nursery an accurate selection of the best growers is not possible. Such an area will require a high stand per acre of about 300 points and a more rigid selection in the field after 12 to 18 months growth.

Budgrafting: Details of budgrafting procedure are given in Advisory Circular No. 1. Each yard of budwood, according to the clone, will give from 15 to 20 bud points or patches and about 10 to 12 successful budgrafts can be obtained, if the budgrafting is carried out by experienced nursery-men. The standard size for budgrafting stocks in about 1—2 inches in diameter at ground level. Any attempt to accelerate the production of budded stumps by budgrafting small stocks will entail greater care for establishing such stumps in the field, which will be lacking in most middle class plantations. Our Advisory Circular No. 38 suggests the method on a trial scale.

Smaller stocks can be budded (up to $\frac{3}{4}''$ diameter at ground level), if budgrafting is carried out in the field after directly planting seedling stocks in the field. This is the better method in districts where the climatic conditions are not reliable for planting out uprooted planting material from nursery to field. "Holing" for seed-at-stake in field must be of even depth $2\frac{1}{2}' \times 2\frac{1}{2}' \times 2\frac{1}{2}'$ for growing 2 to 3 seeds per hole.

Recommended Clones (Budded Rubber): Most rubber growers have considerable experience of older clones and in this publication we have the newer clones, which have superseded the older clones, on better performance generally. The clones recommended for large scale planting are as follows:—

PB.86, AV 255, PR 107, WG 6278, MK 3/2, RRI 501, RRI 513.

Further clones appear in the recommended list under the Rehabilitation Scheme. Some of these are particularly useful for growers, who do not give the best attention with regard to cultural operations, disease control and tapping systems.

Clone PB 86 is the best clone, which has given high yields and shown good growth and resistance to disease under a variety of planting conditions. For a limited acreage, the planting of the clone on the whole area is quite feasible. In large scale replanting programmes the clone can be safely planted up to 50% of the total acreage.

The other clones are all high yielding, and in particular instances one may do better than another according to the environmental conditions. In general we recommend clones PB86 and PR.107 for the Matale and Galle districts, and on elevations and in districts more susceptible to Oidium leaf disease.

The other clones do best in the wet low country districts. WG.6278 does well under good soil conditions, and should not be planted extensively on poor soils. We supply limited quantities of authenticated budwood of all recommended clones for purposes of multiplication.

Clone LCB.870: This clone is resistant to Oidium leaf disease and is recommended for planting on the highest elevations and for crown-budding high yielding clones should this procedure prove successful in the future. This clone is not a high yielder. The limited data on yields of 24 trees in the Matale district, indicate that mature trees of 12 to 13 years of age can give about 5 lbs. of dry rubber per tree per year in the wet low country districts. Economic yields should be obtained from about 150 tappable trees per acre.

If in a large scale replanting programme a sizeable acreage is planted with clone LCB.870 on the highest elevations, it will not act as a source of infection of Oidium for the lower areas, and at the same time it will serve as a source of material for crown-budding high yielding clones grown over the lower elevations. Crown budding cannot be done until the budded rubber is about two years old. During this time it will be possible to give more definite recommendations on crown-budding. In general about 10% of the total acreage can be planted with clone LCB.870. Because of its resistance to Oidium we must exploit its rather limited potentialities in yield, by utilising this clone judiciously in our replanted areas, but indiscriminate planting of this clone on a large scale cannot be recommended with our present knowledge of its yields in this country. The clone has not been tapped in the wet low country districts.

Clone TJ.1: This clone has not been in favour in recent years owing to the sharp set-back in yield registered for the year 1952 on most areas. This has been attributed to its peculiar wintering habits, and the resulting severe attacks of Oidium. The poor yield in a dry year like 1952 is also due to the clone's unfavourable reaction to dry weather conditions. It is possible that the yields will recover considerably in future years with better refoliation and adequate rainfall.

Clone GL.1: This clone is capable of giving very high yields compared with high yielding clones like PB.86 and TJ.1 The clone is, however, very susceptible to changes in tapping intensities, and will not be suitable for rubber growers who are inclined to over-tap. Its latex is unsuitable for certain purposes of preservation as latex, but will be suitable for crepe and smoked sheet.

Clone HC.28: This clone is a high yielder, and a quick "girther". Yields of well over 1000 lbs. per acre have been obtained. Its latex is strongly yellowish and is unsuitable for crepe.

Clone MK 3/2: This clone can be planted in the wet low country districts. It is a high yielder, but is susceptible to bark diseases like bark rot and canker of the tapped bark. These diseases can, however, be easily controlled by the use of disinfectants, correctly applied during wet periods.

Clone WG.6278: This clone has also given high yields but does not do well on poor soils.

Clones RRI. 501 and 513: Both these clones can be classed with the best clones we have at the present time for growth and yield. In small scale trials both clones have reproduced their high yielding characteristics under local conditions.

APPENDIX

Details of Estimated Expenditure for Replanting and bringing into bearing one acre of rubber plantation.

First Year.		*Cost per Acre.*
*1.	Felling and Clearing	+ Rs. 7.50
2.	Lining (including cost of pegs)	5.50
3.	Cutting Holes (including cost of dynamiting rocky holes)	27.50
4.	Filling Holes (as in Circular No. 36)	15.00
5.	Weeding (1) Grass & Shrubs	50.00
	(2) Monthly weeding rounds	60.00
6.	Cover crops	5.00
7.	Planting (including cost of budded stumps and protection baskets)	120.00
8.	Manuring (including cost of manure)	20.00
9.	Cleaning out and/or re-cutting drains & Silt Pits ...	7.50
10.	Repairing stone terraces	5.00
11.	Pests & Diseases	60.00
12.	Supplying vacancies	1.50
13.	Tools (Proportionate Charges)	5.00
14.	Boundaries (Fence posts and barbed wire) ...	42.50
15.	Inspection and Attention (including cutting off shoots etc.)	5.00
16.	Watchman (Proportionate charges)	5.00
17.	Paths and Steps	13.00
18.	Roads (Proportionate charges)	10.00
	Total ...	Rs. 450.00

*Provided trees and/or timber are saleable.

Second Year — *Cost per Acre.*

1.	Weeding (monthly rounds)	Rs.	70.00
2.	Supplying Vacancies		2.50
3.	Manure and application		32.50
4.	Pests & Diseases		37.50
5.	Drains & Silt Pits		7.50
6.	Boundaries (Repairs to fences)		5.00
7.	Tools (Proportionate charge)		10.00
8.	Watchman (Proportionate charge)		5.00
9.	Paths & Steps		5.00
10.	Roads (Proportionate charges)		10.00
11.	Inspection & Attention (including cutting "snags")		15.00
	Total	Rs.	200.00

Third Year — *Cost per Acre.*

1.	Weeding (including control of cover crops)	Rs.	60.00
2.	Manure and application		25.00
3.	Pests & Diseases		15.00
4.	Paths & Steps		5.00
5.	Tools		5.00
6.	Watchman		5.00
7.	Roads		10.00
8.	Inspection & Attention (including girth measurements)		10.00
9.	Supplying vacancies		10.00
10.	Boundaries (repairs to fences)		5.00
	Total	Rs.	150.00

Fourth Year — *Cost per Acre.*

1.	Weeding	Rs.	60.00
2.	Manure & Application		30.00
3.	Pests & Diseases		15.00
4.	Cleaning drains & Silt Pits		5.00
5.	Paths & Steps		5.00
6.	Roads		10.00
7.	Inspection & Attention (including girth measurements)		5.00
8.	Tools		10.00
9.	Watchman		5.00
10.	Boundaries (repairs to fences)		5.00
	Total	Rs.	150.00

Fifth Year

		Cost per Acre.
1.	Weeding	Rs. 48.00
2.	Manure and Application	36.00
3.	Pests & Diseases	15.00
4.	Paths & Steps	5.00
5.	Roads	10.00
6.	Inspection & Attention (including girth measurements)	5.00
7.	Cleaning drains & Silt Pits	7.50
8.	Tools	10.00
9.	Watchman	7.50
10.	Boundaries	6.00
	Total ...	Rs. 150.00

Sixth Year

		Cost per Acre.
1.	Weeding	Rs. 36.00
2.	Manure & Application	48.00
3.	Pests & Diseases	15.00
4.	Paths & Steps	5.00
5.	Roads	10.00
6.	Inspection & Attention (including girth measurements)	10.00
7.	Tools...	10.00
8.	Watchman	10.00
9.	Boundaries	6.00
	Total ...	Rs. 150.00

Note:—All these estimates do not include a proportion of expenditure on "General Charges" account.

Summary:

1st Year	...	Rs. 450.00
2nd Year	...	200.00
3rd Year	...	150.00
4th Year	...	150.00
5th Year	...	150.00
6th Year	...	150.00
		Rs. 1,250.00

CHLORDANE

A New Insecticide in Ceylon

BY

D. H. Constable, Agronomist.

General:

"Chlordane" (1, 2, 4, 5, 6, 7, 8, 8a Octachloro-4, 7, methano-3a 4, 7, 7a tetra hydroindane) is an insecticide developed in America during the war which has not previously been available in Ceylon.

The writer had some experience of its use in the West Indies where Fennah (Dept. of Agriculture Trinidad and Tobago Administration Report 1950, page 35) used it most successfully for the control of the leafcutting ("parasol") ant.

Manufacture of this compound has now started under licence in Europe and the writer was fortunate enough to secure a sample, as he considered it likely that it would control the Ceylon Red Ant *Oecophylla smaragdina* which nests in trees and bushes, cementing the leaves together to form a closed nest. A bad attack of these pests may close or render useless 50% or more of the leaves on a tree. It appears particularly fond of citrus, rubber, mangoes, and tea.

The use of D.D.T. and other sprays has been tried but they all need some degree of opening of the nest by means of a pointed stick. Such an action provokes a host of aggressive worker-ants with a painful bite and has not found favour on the large scale.

These ants are a particular pest in Rubber cum Tea estates where they resort to the rubber if attacked when in the tea, returning to the tea bushes when conditions are peaceable. They also vacate the rubber trees during the "wintering" period and on some estates make it difficult for the labourers to carry out maintenance measures as they are all over the ground.

Experimental:

Chlordane is obtainable both as a liquid, miscible in water and as a powder. The former is used at a dilution of one in two thousand and it was this product that is referred to hereafter unless otherwise stated.

Preliminary experiments were carried out on badly infested citrus trees using a "Flit" type hand-sprayer. Under these conditions at least 50% of nests were found to have ceased external activity and it was found to be quite safe to open nests about 24 to 48 hours after a single spraying even if they were occupied. Provided there was no rain, two applications at 24 hours apart to intact nests was found to give complete destruction to 90% nests. A third spray generally completes the process.

Following this small quantities were issued to four estates having tea and rubber.

For convenience the tea nests were treated in each case by the Superintendents concerned.

Each estate was asked to select and mark 50 nests and spray. Count the surviving nests after 24 hours, and spray again. Count the surviving nests (if any) after a further 24 hours and spray once more if necessary.

The results and comments are as follows:—

Estate 1. 1st Test.
1st spray 50% nests killed.
2nd spray 10% nests still alive.

2nd Test.
3 sprays at 24 hours.
All killed.
"It was noticed that live ones from other nests were carrying away the dead ones".

Estate 2. 1st Test.
Showery weather. One spray only.
24 hours 50% ants dead. Activity very reduced.
72 hours still a few ants living.

2nd Test.
Single spray only. Dry weather
24 hours 90%, kill.
"No apparent damage done to foliage in either experiment".
"It would appear that Chlordane at 1:2,000 is successful when applied under dry weather conditions".

Estate 3. One Test only.
24 hours 28 nests (56%) completely destroyed. 2nd spray given.
48 hours Total Destruction.
"Has proved very successful in destroying red ants".
"3 gallons (diluted) of which was found sufficient for destroying 50 ant nests".

Estate 4. One Test only.
48 hours 19 nests dead out of 25 examined. 2nd spray given.
72 hours all dead, no survivors.
"It will be seen from the above that the results have been most satisfactory".

Some rough experiments were tried out with the powder. This was found effective for garden use on bushes and creepers. Put on termite nests in wet weather it appears efficacious.

A colleague testing the powder and liquid on lawn termite nests reports complete control with the liquid but not with the solid.

Summary: It is considered that chlordane used as a water diluted spray in dry weather forms a satisfactory answer to the Tree Nesting Red Ant,

It is practically nonpoisonous to man and warm blooded animals and no worries need be experienced on that score. The estates testing it have not reported any effect on their tea but tea planters intending to use it widely should contact the T.R.I.

Our information both here and in the W. Indies suggests that it is non toxic in all reasonable amounts. It has no skin effects and is used widely in houses in the U.S.A. for cockroach control.

Acknowledgments: Our thanks are due to Messrs. Baurs for a supply of the compound under the name of Intox-8.

Also to Messrs. J. A. T. Swayne, J. Craig, C. R. Warren, and Stanley De Silva for kindly testing and reporting on this substance.

MANURING REPLANTED RUBBER

1938 — 1952

BY

D. H. Constable, Agronomist

THIS paper is mainly a review for planters, of a paper by Constable & Hodnett appearing in the Empire Journal of Experimental Agriculture.

At the same time, the natural delays due to correction of proofs, printing etc. have made it possible to include the results for 1952 in this article. No conclusions have been altered by this inclusion, but one more treatment effect has at last attained significance.

(1) **Introduction.**—A fertiliser experiment on *Hevea Brasiliensis* has been in progress at Dartonfield, since 1938. The object of this review is to report the results obtained in relation to the production of girth and the yield of rubber.

(2) **Description of the Experiment.**—The experiment is on a light sandy soil in the Kalutara district, on rather steep and rocky land typical of this whole rubber growing district.

It is principally a test of the effects of one single rate of application of nitrogen, phosphate, and potash in all combinations namely Nil, N, P, K, NP NK, PK and NPK. In addition an extra treatment of compost is introduced as a separate plot. These nine treatments are applied to six different budded clones, namely TJ.1, PB183, W259, HC28, PB86 and PB 186.

The rates of application of the different fertilisers are:

	Before Tapping	After Tapping
Sulphate of Ammonia (20% N)	15 ozs. per tree per year	35 oz.
Saphos (rock) Phosphate (30% P_2O_5)	10 ozs. per tree per year	23 1/3 oz.
Muriate of Potash (60% K_2O)	5 ozs. per tree per year	11 2/3 oz.

These rates provide 3 ozs. each of each plant nutrient in the pretapping period, and 7 ozs. each during tapping.

The compost was applied at an average rate of 50-60 lbs. per tree per year, to give the same rates of nutrient application. Inorganic fertilisers were added to it when necessary to keep the relative nutrient proportions constant. The compost was actually a processed town refuse. The whole experiment consisting of nine treatments on six clones, each in a separate block, occupies 19½ acres and comprises 2,160 trees. Each clonal/treatment plot therefore consists of 40 trees of which the central sixteen are used for record purposes.

Girth measurements were commenced in 1941, and have been taken yearly since. Tapping was commenced in 1944 on a plot basis, whenever any plot had 75% of trees over 18" girth. S/2,d/2,100% tapping has been used throughout with no extra tapping to make up for losses due to weather conditions. The plot yields have been determined by sampling once a month. The latex from each plot is bulked separately, weighed, and a 50 ml sample taken, coagulated, milled, and weighed. From this latter result the whole plot weight is calculated, an allowance being made for scrap by collecting and weighing it at the time of the sample tapping.

In addition the normal intake for the whole experimental area, is recorded at every tapping, and since 1948 the accuracy of the bulk yield figures has been improved, by sampling each tapper's latex at each tapping, instead of using the hydrometer technique. An accurate yearly average yield for the entire area is thus available, and from this, the treatment yields in lbs. per acre per annum are computed, using the relative proportions of the aggregate yearly plot sample totals.

Results:

(**a**) **Girths.**—Tables 1, 2, 3, and 4 show the results of the girth measurements in 1944 and 1952, the increment 1944-52, and the summarised effects. The year 1944 is the last year in which girth measurements are uncomplicated by tapping effects. The results up to that year therefore, may be taken as indicative of the value of the treatments in bringing the trees to tappable girth. The 1952 results may be taken as showing the longer term value of treatments, and the increment figures give the effects of fertilisers once tapping has started.

TABLE I.

Girths 1944 in inches

	O	N	P	K	NP	NK	PK	NPK	Compost	Average
TJ.1	16.3	14.9	17.8	13.7	17.4	16.6	19.8	17.3	21.2	17.2
PB.183	11.5	10.8	16.7	14.5	18.5	12.9	13.1	17.3	12.8	14.2
W.259	15.2	16.6	15.0	14.6	17.1	14.0	16.0	17.5	15.9	15.8
HC.28	15.1	15.1	16.7	18.4	17.7	18.5	19.7	20.8	17.9	17.8
PB.86	14.8	13.4	16.6	12.5	17.8	14.0	18.1	16.3	17.5	15.6
PB.186	15.1	15.9	17.3	11.8	19.7	18.8	19.0	20.1	20.6	17.5
Average	14.6	14.5	16.7	14.2	18.0	15.8	17.6	18.2	17.7	

TABLE II.

Girths 1952 in inches

	O	N	P	K	NP	NK	PK	NPK	Compost	Average
TJ.1	25.3	23.4	27.6	21.7	27.4	25.7	26.8	26.5	29.8	26.0
PB.183	23.5	24.2	29.2	24.2	28.2	24.2	28.8	27.9	28.9	26.6
W.259	29.0	26.8	28.7	25.6	29.6	24.2	27.7	28.3	26.6	27.3
HC.28	26.9	26.6	28.1	29.5	29.5	29.1	31.0	31.5	29.6	29.1
PB.86	24.1	25.5	29.2	25.0	27.5	26.2	26.4	29.5	29.8	27.0
PB.186	22.5	27.5	25.8	20.1	28.6	30.7	27.2	28.4	31.4	26.7
Average	25.2	25.7	28.1	24.4	28.5	26.6	28.0	28.7	29.4	

TABLE III.

Girth Differences 1944–52 in inches

	O	N	P	K	NP	NK	PK	NPK	Com-post	Aver-age
TJ.1	9.0	8.5	9.8	8.0	10.0	9.1	7.0	9.2	8.6	8.8
PB.183	12.0	13.4	12.5	9.7	9.7	11.3	15.7	10.6	16.1	12.3
W.259	13.8	10.2	13.7	11.0	12.5	10.2	11.7	10.8	10.7	11.6
HC.28	11.8	11.5	11.4	11.1	11.8	10.6	11.3	10.7	11.7	11.3
PB.86	9.3	12.1	12.6	12.5	9.7	12.2	8.3	13.2	12.3	11.4
PB.186	7.4	11.6	8.5	8.3	8.9	11.9	8.2	8.3	10.8	9.3
Average	10.6	11.2	11.4	10.1	10.4	10.9	10.4	10.5	11.7	

TABLE IV.

Summary of Tables 1, 2 & 3

(*a*) **Order of Merit**

1944		1952		1944-52	
NPK	18.2″	Compost	29.4″	Compost	11.7″
NP	18.0″	NPK	28.7″	P	11.4″
Compost	17.7″	NP	28.5″	N	11.2″
PK	17.6″	P	28.1″	NK	10.9″
P	16.7″	PK	28.0″	O	10.6″
NK	15.8″	NK	26.6″	NPK	10.5″
O	14.6″	N	25.7″	PK)	10.4″
N	14.5″	O	25.2″	NP)	10.4″
K	14.2″	K	24.4″	K	10.1″
S.E. of mean of 6 = ± .98″		S.E. of mean of 6 = ± .33″		S.E. of mean of 6 = ± .66″	

(*b*) **Mean Treatment Effects**

		Diff.			Diff.			Diff.
No. N	15.9″	0.8″	No. N	26.4″	1.0″	No. N	10.6″	
N	16.7″		N	27.4″		N	10.8″	0.2″
No. P	14.8″	2.8″	No. P	25.4″	2.9″	No. P	10.6″	
P	17.6″		P	28.3″		P	10.7″	0.1″
No. K	16.0″	0.5″	No. K	26.9″	0.0″	No. K	10.9″	
K	16.5″		K	26.9″		K	10.4″	—0.5″
N or K	16.1″	0.2″	N or K	27.1″	—0.5″	N or K	10.5″	
NK	16.3″		NK	26.6″		NK	10.9″	0.4″
S.E. of mean of 24 = ± .49″			S.E. of mean of 24 = ± .16″			S. E. of mean of 24 = ± .33″		

The results are best appreciated by studying Table 4, where each set of results are shown in order of merit. (This order of merit does not constitute a demonstration of the superiority of any one treatment over those below it in the list. The necessary difference between treatments required for significant superiority is given by three times the standard error (S.E.). Thus, for 1944, 3 × S.E. = 3 × .98″= 3 inches approx. Therefore for NPK at 18.2″ any treatment of 15.2″ or less i.e. O, N and K, are significantly inferior. Or for O any value of or greater than 14.6″ + 3″ = 17.6″ is significantly superior i.e. PK, Compost, NP and NPK.

In addition to the order of merit the main fertiliser treatment effects are shown e.g. the average value for all treatments containing nitrogen as against those without it.

We have therefore, for both 1944 and 1952, the fact that Compost is better than nil, but not significantly better than the mixed inorganic fertilisers, and that phosphate with an average effect of approximately 3″ better girth is highly significant. In addition in 1952 the Nitrogen effect of 1″ better girth has become significant together with an NK effect of ½ inch (these effects had not become apparent in the figures quoted in the original paper).

As regards the period 1944-52 no treatment shows any tendency towards significance.

(**b**) **Yields.**—In Tables 5 & 6 are given, the average yearly yields for the whole tapping period 1944-52 and a summary of the effects.

TABLE V.

Average yields of dry rubber 1944-52 in lbs./acre/annum

	O	N	P	K	NP	NK	PK	NPK	Com-post	Aver-age
TJ.1	582	467	774	366	816	700	601	694	782	643
PB.183	264	327	584	321	473	313	505	497	506	421
W.259	600	401	417	318	377	333	486	416	362	412
HC.28	510	421	575	562	533	527	606	563	477	530
PB.86	645	582	832	551	772	653	750	772	687	694
PB.186	505	480	611	276	694	740	668	674	788	604
Average	518	446	632	399	611	544	603	603	600	

TABLE VI.

Summary of Table 5

Order of Merit			Mean Treatment Effects			
P	632 lbs./acre		No. N	538	Difference	S.E. of mean of 24 =
NP	611	S.E. of mean of 6	N	551	13 lbs./acre	± 19 lb./acre
PK	603	= ± 37 lbs./acre	No. P	477		
NPK	603		P	612	135 lbs./acre	
Compost	600		No. K	551		
NK	544		K	538	13 lbs./acre	
O	518		N or K	515		
N	446		NK	574	59 lbs./acre	
K	399					

The average yield of the whole area since the start of tapping has been 544 lbs. per acre. If consideration is given only to the major clones TJ.1, HC28, PB86 and PB186, and to the phosphate containing treatments and compost, this average rises to 683 lbs/acre.

The summary shown in Table 6 shows less variation in the relative order of merit for yields than there was for girths, with the exception of N and K which are significantly low. In the mean treatment effects phosphate is highly significant as is the NK combination. This latter figure does not express a high NK value but rather the fact that N and K together are some 40% better than either alone. This improvement is not maintained when Phosphate is introduced into the combination and NPK shows no advantage over NP, PK or P.

It will be noted that phosphate has been worth 135 lbs. per acre per year extra rubber a figure which is significant. Also that potash *alone* (Table 5) at 399 lbs. per acre has given 119 lbs. per acre less than nil treatments and 145 lbs. per acre less than the average of all treatments both of which figures are significant.

A similar potash effect on alluvial soil has been noted recently in Malaya.[11]

One of the drawbacks to the design of experiment used, is that each block is a separate clone, and the estimate of error which is based on the variance of the same treatment in six blocks, contains also any variation due to different reactions to the same treatment by different clones.

This latter possibility was investigated in the original paper by subdivision of the variance due to the interaction of clones (blocks) and treatments, into its separate components of clones, and main effects (N, P and K), together with a remainder of clones and interaction effects (NP, NK, PK and NPK). Using the remainder as an estimate of error, a significant value was obtained for Nitrogen and clones in the 1951 girth data, and in the total yield figures.

This significant value is a reflection of an apparent positive response to nitrogen by TJ.1 and PB186 which response is apparently higher in the presence also of potash. This effect is also given in the 1952 girths, where the previously mentioned significant N effect averaging 1″ for all clones is mainly due to an effect of 2.4″ in the growth of PB186. This cannot be considered as a proof of the existence of clonal interactions but does provide strong evidence that experimental designs must not be based on an assumed absence as seems to have been done in Hevea in the past.

(4) **Conclusions.**—In drawing conclusions from these results some consideration must be given to the terrain and the relative accuracy of the two forms of measurement of treatment effects.

The land is generally steep and very sandy, so that there is a liability to loss of the soluble fertilisers under an average rainfall of 160-180 inches. In addition even a vertical leaching of nutrients is effectively lateral, so that there is a possibility for nutrients to be spread beyond their proper plot boundaries. With the small root system of the early years this effect is not so likely to be marked but as maturity is approached it is likely to level out the plot differences.

Measurement of treatment effects by means of girth is extremely accurate and is open to no doubt, but the collection of plot yield figures is far less satisfactory. Apart from the question of sampling, there are the effects due to different tappers ability, and the difference between the beginning and end of task. Permanent and temporary loss of trees by wind damage and disease is another troublesome factor as the effect of the loss of a single tree in a sixteen tree plot is high.

For these reasons, and because the high correlation of yield and girth in any one clone is well established, the author prefers to base his conclusions mainly on girth results. However any effect showing up in the yield figures is likely to be considerably more positive than the statistical analysis shows and provided it passes the statistical significance test can be safely accepted.

Considering girths then, in the main, we come to the conclusion that phosphate is essential to bring the tree to early tapping and is worth nearly 3″ girth in 6 years. Further that nitrogen in combination with it is probably worth another 1″. Compost produces the same results as phosphate but is not significantly better though over the full period it has consistently improved its position. It is very noticeable that no fertiliser has shown a significant effect on girth in the nine years following the start of tapping. This may be ascribed to the point mentioned earlier in this section namely that with the increasing root system the best treatments are being "poached" by the trees on the worst treatments. Equally however this may indicate that the important period for manuring is up to tapping. In confirmation of this it has been a general experience throughout the East that manuring mature rubber gives few direct results and there exists no consistent experimental proof of its value.

The effect of phosphate is amply corroborated in the yield results though none of the other effects are. There is an NK effect but as previously noted this reflects only the high relative improvement of nitrogen plus potash over either alone.

Potash has had little or no effect in this experiment, except that alone, it appears to cause a serious retarding of tree growth as to a lesser extent does nitrogen alone.

(5) **Recommendations.**—This experiment confirms the necessity of phosphate manuring on light soils for good growth of trees.

The desirability of nitrogen is also indicated though its effect is not so pronounced.

Potash has proved of no value in this experiment and cannot be recommended on these grounds therefore. However symptoms of potash deficiency corroborated by leaf analyses have been found in districts covering the majority of the rubber growing area. Therefore the omission of potash is not recommended.

The experiment indicates that the most important manuring period in the life of a tree is the first seven years. We suggest that no economies should be practised during this period in respect of fertiliser quantities or applications.

Applications of Potash alone are definitely injurious to the growth of the tree, and it is possible that nitrogen alone in the young state is also bad.

No further recommendations can be made on the basis of this experiment. Planters are advised to refer to the other articles recently published or in course of publication for our full recommendations arising as a result of all experiments.

Conclusion.—The co-operation of Mr. G. E. Hodnett of Rothamsted in producing the original paper from which this is largely abstracted is gratefully acknowledged.

Also the help given by Dr. F. Yates and Mr. D. D. Paterson in preparing the original paper and approving the statistical methods used.

BOOK REVIEW

Wild Flowers of the Ceylon Hills by Thomas E. T. Bond

This timely publication fills the long felt want for the Ceylon Naturalist and Botany student as no other Book on Ceylon's Wild Flowers has previously been published.

The flowers described are commonly found above the 3,000 feet elevation and a similar volume on the flora of the low country would be a great advantage.

Each of the 120 species of plants described is illustrated by clear line drawings and a convenient colour key is provided so that identification is made relatively easy. The illustrations are by Jessie and Thomas Bond. The book could have been greatly improved, but at a probably prohibitive cost, by providing coloured plates for each species. The one coloured plate is of excellent quality.

The type is clear and the book of a handy size and very well written with a useful glossary and interesting general notes where pertinent.

The volume has been published by the Oxford University Press, Madras.

(Sgd.) H. E. YOUNG

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 117th meeting of the Rubber Research Board held at the Planters' Association Head Quarters, Colombo, at 2-30 p.m. on Monday 26th January, 1953.

Present.—Mr. W. P. H. Dias, J.P. (in the Chair), Mr. G. H. Dulling, Mr. R. J. Hartley, Mr. W. Herbert de Silva and Dr. H. E. Young (Director, R.R.I.C.).

Dr. A. W. R. Joachim, Mr. R. H. Wickremasinghe and Major Montague Jayewickrema, M.P. had intimated their inability to attend the meeting. Major Jayewickrema was granted leave of absence from the meeting as requested by him.

1. Minutes.

(a) **Confirmation.**—Draft minutes of the meeting held on 27th October and the Special Meeting on 23rd December 1952, which had been circulated to members, were confirmed and signed by the Chairman.

(b) **Matters arising from the minutes.**

1. Medical Board.—It was noted that arrangements had been made for the services of Govt. Medical Boards to be made available to the Institute.

2. Senior Staff Medical Scheme.—Proposed rules for the Senior Staff Medical Scheme were approved subject to a few minor amendments.

2. Reports and Accounts.

(a) **Statement of Receipts and Payments for the 3rd Quarter 1952.**—was tabled.

(b) **Director's report on visit to U.K.** was approved.

3. Experimental Committee.
Recommendations made at meeting held on 12th January 1953.

(a) **Visiting Agent's Report.**—As recommended by the Committee, it was agreed that the V.A's Report be accepted with the exception that it was not considered that the purchase of a bulldozer was desirable.

(b) **Tenders for Buildings.**—The Committee's recommendation that tenders for as many buildings as practicable in the 1953 programme be called for in a single tender was accepted.

4. Smallholdings Committee.
Recommendations made at meeting held on 12th January 1953.

(a) **Transfer of S.H. Dept. to Nivitigalakele.**—As recommended by the Committee, it was agreed that the transfer of the S.H. Department to Nivitigalakele was not practicable because of the implications of co-operation with the Rubber Commissioner and also because of the lack of accommodation for staff at Nivitigalakele.

5. Staff.

(a) **Contract period of Senior Staff.**—Agreed that the contracts of Senior Officers should cover the period of service as well as the end-of-contract leave in each case.

(b) **Scholarship for Research Assistant.**—It was reported that Mr. A. J. Jeevaratnam, Research Assistant (Agronomy Dept.) had beeen awarded a scholarship by the Australian Govt. under the plan for Technical Aid to S.E. Asia and had left Ceylon on 21st January 1953.

(c) **Intermediate Staff.**—The following appointments were reported:—

1. Mr. L. Wijeyegunawardena as Plant Breeder (Bot. Dept.) with effect from 2nd January 1953.

2. Mr. M. Nadarajah, B.Sc. (Ceylon) as Research Assistant (Chemical Dept.) with effect from 15th December 1952.

(d) **Assistant Staff.**—Changes in staff since the last meeting were reported.

6. London Advisory Committee.—Minutes of the 57th meeting of the Committee and 4th meeting of the Executive Committee were tabled.

The meeting terminated at 3-40 p.m. with a vote of thanks to the Chair proposed by Mr. Hartley.

(Sgd.) C. D. de Fonseka,
Secretary-Accountant.

Dartonfield,
Agalawatte.
7-2-1952.

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 118th meeting of the Rubber Research Board held at the Planters' Association Head Quarters, Colombo, at 2-30 p.m. on Monday, 23rd February 1953.

Present.—Mr. W. P. H. Dias, J.P., (in the Chair), Mr. W. Herbert de Silva, Mr. R. J. Hartley, Mr. G. H. Dulling, Major Montague Jayewickrema M.P., Gate Muhandiram Arthur D. S. Jayasinghe, Dr. A. W. R. Joachim M.B.E. (Director of Agriculture), Senator C. F. W. Wickremasinghe, Mr. R. H. Wickremasinghe (Controller of Supply & Cadre) and Dr. H. E. Young (Director R.R.I.C.).

Mr. E. W. Whitelaw attended by invitation.

After the minutes of the last meeting were confirmed the Chairman welcomed Mr. E. W. Whitelaw who had been specially invited to attend the meeting. Mr. Whitelaw was for a number of years one of the best known planting personalities in the rubber industry in Ceylon and his views regarding the present state of the plantation rubber industry in Ceylon were welcomed by the Board. Mr. Whitelaw was also a member of the Commission on the Rubber Industry in Ceylon whose valuable report was submitted in 1947.

Mr. Whitelaw thanked the Chairman for having invited him to attend the meeting. He was no stranger to the Board as he had served on it for 14 years before he left Ceylon. He thought the greatest danger to Ceylon's rubber industry was the spread of Oidium leaf disease and he was very happy to note from a recent article in the press that a satisfactory solution to the problem had been found in the clone LCB. 870 which has been proved to be resistant to this disease. He considered that this was of very great significance to the rubber industry and was in fact the most important occurrence for Ceylon rubber for many years. As the clone was now known to be a moderately high yielder he endorsed the Board's opinion that it was the best material for use by Smallholders. The crown budding technique adopted in Ceylon for budding high yielding trees with resistant material was also being used in other countries for resistance to other diseases.

The meeting terminated after the consideration of a few domestic matters.

(Sgd.) C. D. de Fonseka,
Secretary-Accountant.

Dartonfield,
Agalawatte.
3rd March, 1953.

RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 119th meeting of the Rubber Research Board held at the Planters' Association Head Quarters, Colombo, at 2-30 p.m. on Monday 30th March 1953.

Present.—Mr. W. P. H. Dias, J.P. (in the Chair), Mr. W. Herbert de Silva, Mr. R. J. Hartley, Gate Muhandiram Arthur D. S. Jayasinghe, Mr. L. J. de S. Seneviratne C.C.S. (Deputy Secretary to the Treasury), Senator C. F. W. Wickremasinghe and Dr. H. E. Young (Director R.R.I.C.).

Mr. B. Mahadeva, Acting Rubber Controller, was present by invitation.

Apologies for absence were received from Mr. G. H. Dulling, Major Montague Jayewickrema M.P. and Dr. A. W. R. Joachim (Director of Agriculture).

1. Board:—The Chairman welcomed to the Board Mr. L. J. de S. Seneviratne, Deputy Secretary to the Treasury, who had been nominated to represent the Minister of Finance with effect from 21st March 1953 in place of Mr. R. H. Wickremasinghe. A vote of thanks was passed for Mr. Wickremasinghe's services.

He also welcomed to the meeting Mr. B. Mahadeva, Acting Rubber Controller, who had been specially invited to attend.

2. Minutes:—Draft minutes of the meeting held on 23rd February 1953, which had been circulated to members, were signed by the Chairman subject to two minor amendments.

3. Reports and Accounts:

(a) **Annual Report for 1952.**—was approved and it was agreed that it should be printed.

(b) **Statement of Receipts and Payments for the 4th Quarter 1952** was approved.

4. Staff:

(a) **Director**—Agreed that Dr. H. E. Young, Director, should have three months leave out of the island from about the end of May 1953.

(b) **Clerical assistance and administration:**

1. **Acting Director.**—Agreed that Mr. J. H. Van Emden, Mycologist, should act for the Director during the latter's absence on leave.

2. **Administrative Secretary.**—Agreed that Mr. C. D. de Fonseka, Secretary-Accountant, be appointed Administrative Secretary with effect from 30th March, 1953.

3. **Additional Clerk.**—Agreed that an additional clerk be appointed to the Head Office.

5. Experimental items:

(a) **Field Experiment for Oidium research.**—The establishment of an experimental plot of about one acre near the laboratories at Dartonfield for the purpose of investigating wet sprays for Oidium control was approved.

(b) **Conference and Field Day.**—Agreed that a Rubber Conference be held in Colombo in September or October 1953 followed by a Field Day at Dartonfield later in the year.

6. London Advisory Committee.—Draft minutes of the 2nd meeting of the Agricultural Sub Committee and 5th meeting of the Executive Committee were tabled.

7. Publications.—The Combined 1st and 2nd Quarterly Circular for 1952 was tabled.

8. Any other business:

Sulphur dusting Smallholdings.—The question of assisting smallholders and small estate owners to sulphur dust their holdings was considered and the Director was asked to put up a scheme for the Board's consideration after consulting the Rubber Controller in the matter.

The meeting terminated at 3-50 p.m.

(Sgd.) C. D. de Fonseka,
Administrative Secretary.

Dartonfield,
Agalawatte.
8-5-53.

Minutes of the 120th meeting of the Rubber Research Board held at the Planters' Association Head Quarters, Colombo, at 2-30 p.m. on Monday 18th May 1953.

Present.—Mr. W. P. H. Dias J.P. (in the Chair), Mr. G. H. Dulling, Mr. W. Herbert de Silva, Mr. R. J. Hartley, Major Montague Jayewickrema M.P., Dr. A. W. R. Joachim M.B.E. (Director of Agriculture), Gate Muhandiram Arthur D. S. Jayasinghe, Dr. H. E. Young (Director) and Mr. C. D. de Fonseka (Administrative Secretary).

Mr. J. H. Van Emden (Mycologist) was present by invitation.

At the commencement of the meeting the Chairman congratulated Major Jayewickrema on his appointment as Acting Minister of Transport & Works.

1. Board:—A letter from Senator C. F. W. Wickremasinghe stating that he would be away from the island from 25th May to 30th September 1953 was read and it was agreed that he be given leave of absence from meetings during this period.

2. Minutes:

(**a**) **Confirmation.**—Draft Minutes of the meeting held on 30th March 1953, which had been circulated to members, were confirmed and signed by the Chairman.

(**b**) **Matters arising from the Minutes:**

Sulphur dusting Smallholdings.—The scheme outlined by the Director for assisting smallholders and small estate owners to sulphur dust their holdings was approved and he was asked to take the necessary steps regarding its implementation.

3. Experimental Committee:

Recommendations made at meeting of 27th April 1953:

(**c**) **Community Centres.**—Contracts awarded by the Committee for construction of community centres at Dartonfield and Hedigalla were approved.

(**b**) **Improvement of Asst. Staff bungalows.**—The provision of extra lighting points and a shower bath at each bungalow, as recommended by the Committee were approved.

(**c**) **Rubber Rehabilitation.**—Reported that, as approved by the Committee, Egal Oya Farm had been taken over for establishing a nursery for the production of budded stumps. Arrangements made in this connection were approved.

4. Staff.

(**a**) **Acting Director.**—Agreed that Mr. J. H. Van Emden, Mycologist, should act as Director during the absence on leave of Dr. H. E. Young with effect from 9th June 1953.

(**b**) **Assistant Staff.**—Changes in staff since the last meeting were reported.

5. Training facilities on development projects.—In response to a request from the Ministry of Agriculture and Food, it was agreed that training facilities be provided at the Institute for two students from abroad under the Colombo Plan Technical Co-operation Scheme.

6. Registration of Rubber Smallholders' Co-operative Societies.—Reported that the Registrar of Co-operative Societies had promised to have all the Co-operative Societies in which the Institute is interested registered within two weeks.

Members wished the Director a pleasant holiday.

The meeting then closed with a vote of thanks to the Chair.

Sgd. C. D. de Fonseka.
Administrative Secretary.

Dartonfield,
Agalawatte.
10-6-53.

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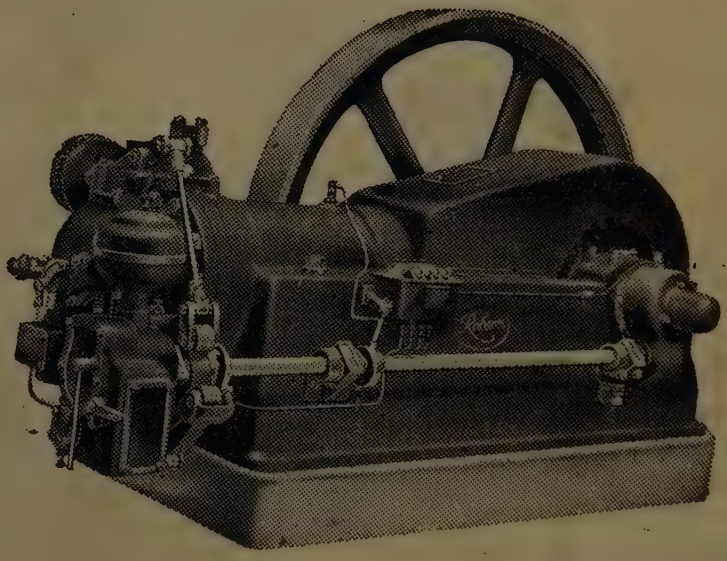

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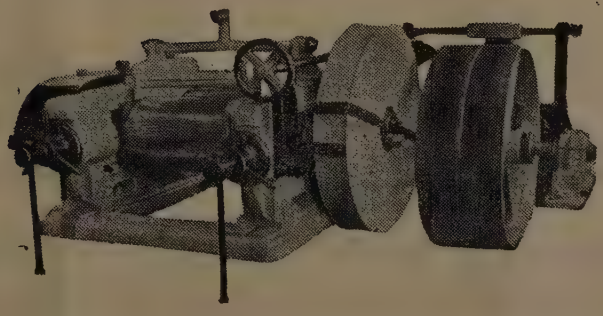

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Chemist ... E. J. Risdon, M.A., D.Phil., (Oxon) A.R.I.C.

Research Assistant ... M. Nadarajah, B.Sc. (Ceylon)

Laboratory Assistants ... D. S. Muthukuda, M. T. Veerabangsa & G. G. Gnanasegaram

Botany Department

Botanist ... C. A. de Silva, B.Sc., (Lond.) C.D.A. (Wye)

Research Assistant ... Vacant

Plant Breeder ... L. Wijeyagunewardene

Computer ... W. G. V. Fernando

Laboratory Assistant ... C. Amaracone

Mycology Department ...

Mycologist & Oidium Research Officer Ir. J. H. Van Emden (Wageningen)

Actg. Asst. Mycologist ... D. M. Fernando, B.Sc., (Ceylon)

Laboratory Assistants ... H. L. Munasinghe & E. G. Mendis

Agronomy Department

Agronomist ... D. H. Constable, M.Sc., D.I.C. A.R.C.S.

Research Assistant ... A. J. Jeevaratnam, B.Sc., (Agr.) (Ceylon)

Laboratory Assistant ... T. C. Z. Jayman

Estate Department

Superintendent ... G. W. D. Barnet

Officer-in-Charge, Egal Oya Nurseries H. M. Buultjens

Conductors-in-Charge ... J. Pitchamuthu (Acting) L. P. de Mel & D. C. Kannangara

Experimental Conductors (5)

Clerks (3)

Rubber-Maker, Storekeeper, Dispenser, Senior Artisan and Electrician

Smallholdings Department

Smallholdings Propaganda Officer ... W. I. Pieris, B.A. Hortic (C'tab.)

Assistant Propaganda Officers ... N. W. Palihawadana, K. Wilson, de Silva, H. H. Peiris and P. W. W. de Silva, B.Sc, Agr. (Ceylon) (Probationery)

District Field Officers ... D. R. Ranwala, P. S. G. Cooray, D. E. A. Abeywickrema and B. D. Pedrick

Rubber Instructors (36)

Clerks (4)

Administration

Administrative Secretary ... C. D. de Fonseka, A.C.C.A., A.C.C.S.

Chief Clerk ... B. Tillekeratne

Clerks (8) and Clerk-Librarian

NOTE: The Laboratories and Head Quarters Offices of the Institute are situated at Dartonfield Estate, Agalawatta, Telephone No. 26 Agalawatta. Telegraphic Address 'Rubrs' Agalawatta. There are two Experimental Stations, one at Nivitigalakele, Matugama and the other at Hedigalla, Latpandura. The office of the Smallholdings Dept. is at Eastern Bank Buildings, Fort, P.O. Box 901, Colombo. Telephone No. 2462 Colombo.

All enquiries and other communications should be addressed to the Director, Rubber Research Institute of Ceylon, Agalawatta.